

Prenatal exposure to a mixture of EDCs, maternal thyroid function and child neuro

Principal Investigator: Horton, Megan K

Institute

Receiving Icahn School Of Medicine At Mount Sinai

Award

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DESCRIPTION
(provided by
applicant):

The overarching goal of the proposed research is to elucidate mechanisms relating prenatal exposure to complex mixtures of endocrine disrupting compounds (EDCs) to adverse neurodevelopment sequelae in children. Several classes of EDCs are known to interfere with thyroid function. Adequate thyroid function during pregnancy is a known determinant of successful fetal brain development and maternal thyroid hormone insufficiency is associated with adverse developmental outcomes in experimental animals and humans. Although several studies have evaluated risks associated with exposure to single classes of EDCs, these studies are limited in their evaluation of the complex mixtures within the human exposome and have not explored structural deficits in brain development leading to adverse outcomes. The proposed study attempts to address these limitations by developing a composite index of body burden to EDCs and by applying brain imaging methods to elucidate changes in brain structure and function following exposure. Specifically, we propose to evaluate whether prenatal exposure to a complex mixture of EDCs is associated with a) disrupted maternal thyroid function, b) changes in brain structure and function in children at 5 years of age and c) adverse neurobehavioral and psychological function in children at 5 years of age. The training and research will take place within the ongoing Metropolitan Study of Chemicals and Pregnancy Health (The Parent Study) (R21ES016610-01 PI. Wapner). This is a prospective study of 316 mothers enrolled during pregnancy. The parent study provides information key to the current proposal including prenatal exposure levels to polybrominated diphenyl ethers (PBDEs) and perchlorate, an assessment of maternal thyroid function during the 2nd trimester of pregnancy, and consent to contact mothers for prospective follow-up of their offspring. Additionally, stored biological samples are available for additional EDC analysis. During the initial K99 phase, Dr. Horton proposes to measure BPA and phthalates in stored maternal urine samples. In combination with the PBDE and perchlorate data, she will develop and apply sophisticated statistical methodologies to examine the impact of a complex mixture of EDCs on maternal thyroid function. Also during the K99 phase, Dr. Horton will receive intensive training in the use of brain imaging in epidemiological studies at the New York State Psychiatric Institute. During the transition to independence in the R00 phase of the award, she proposes to apply these trainings within the context of the parent study. Specifically she will follow

75 children, selected on exposure status, with brain imaging (anatomical and functional magnetic resonance imaging) and neurodevelopmental testing. Finally, Dr. Horton will apply these data to examine the complex relationships between prenatal EDC exposure, maternal thyroid function, children's brain structure and function and developmental outcomes using a meditational model. This K99/R00 proposal is a direct extension of the candidate's previous work in children's environmental health and a logical progression into a career as a life-course epidemiologist focused on environmental exposures. At the conclusion of this award, the candidate will have gained expertise in the emerging fields of chemical mixture analysis and brain imaging. The acquisition of these skills sets the candidate above other researchers by combining competence across several disciplines.

Science

Code(s)/Area of Science(s) Primary: 61 - Neurodevelopmental

Publications See publications associated with this Grant.

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